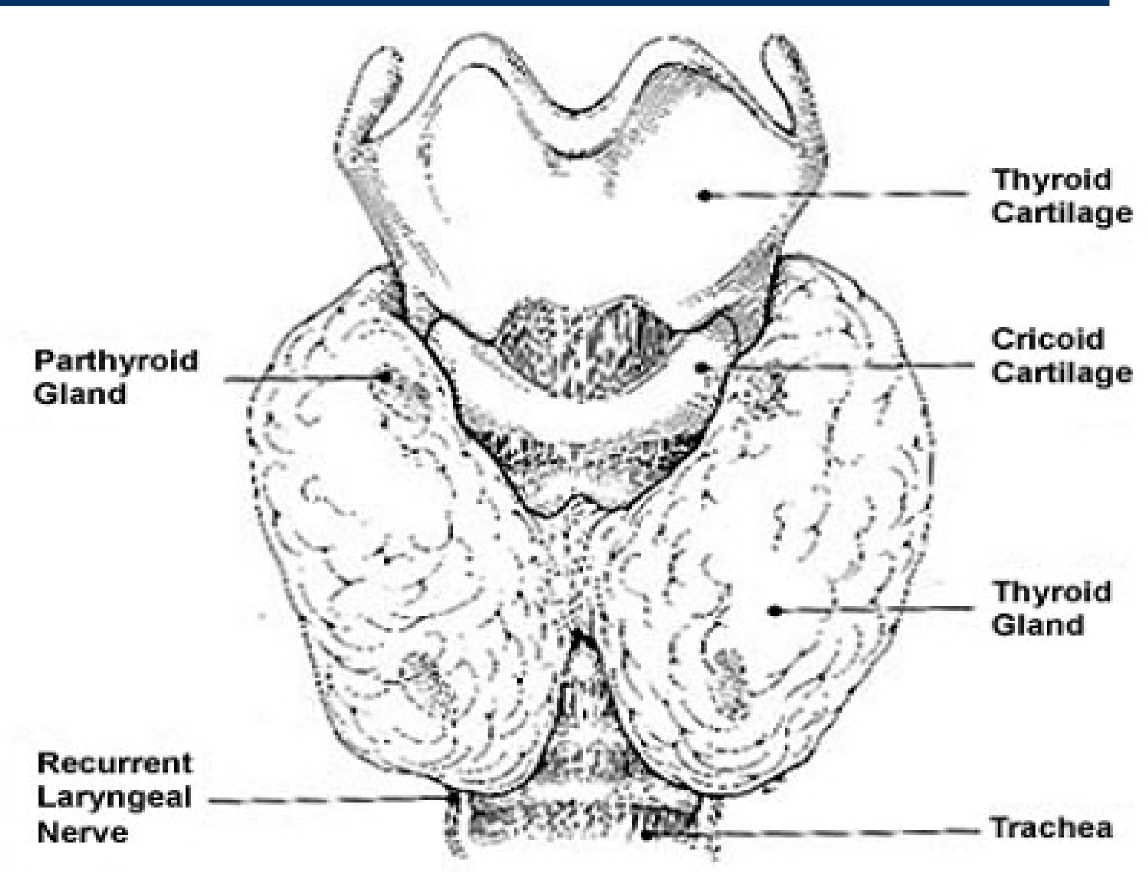
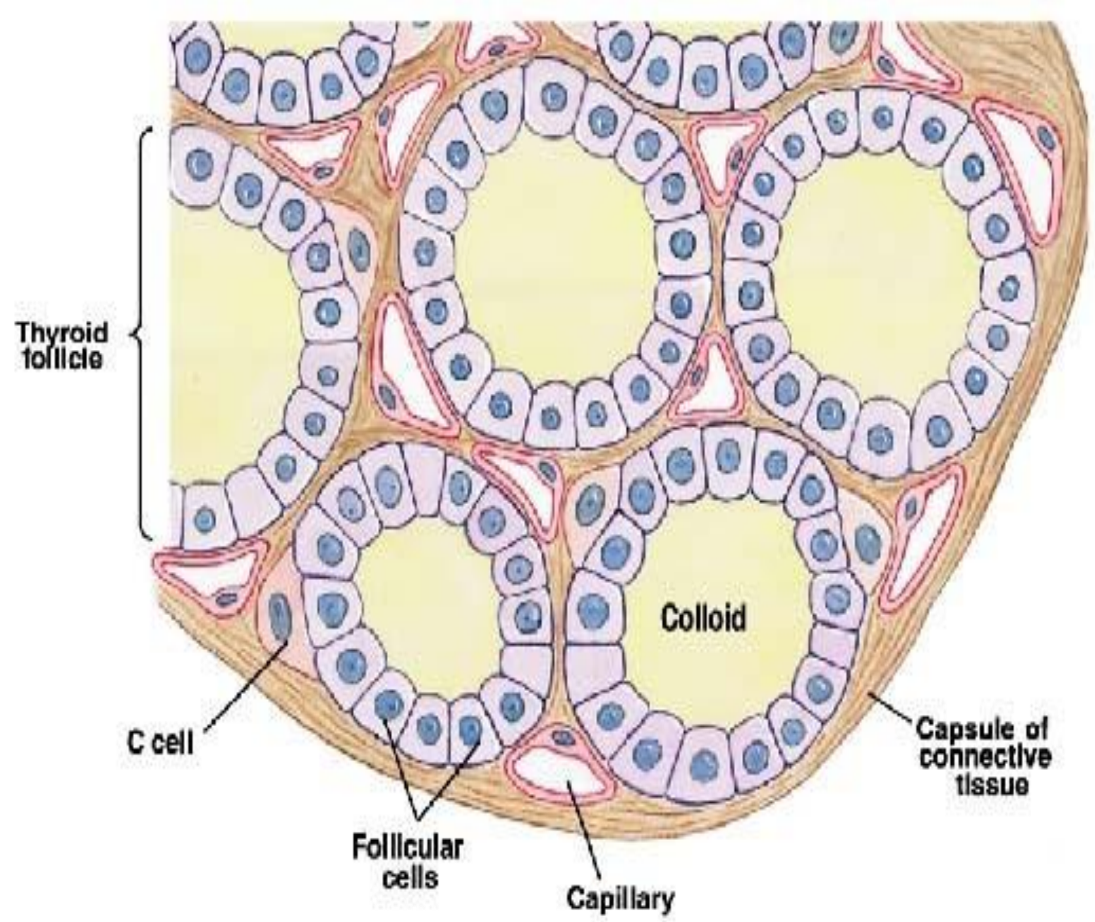
Approach to a thyroid nodule

Dr. Khaled Amer
General surgery specialist

Anatomy of the Thyroid Gland



Follicles: the Functional Units of the Thyroid Gland



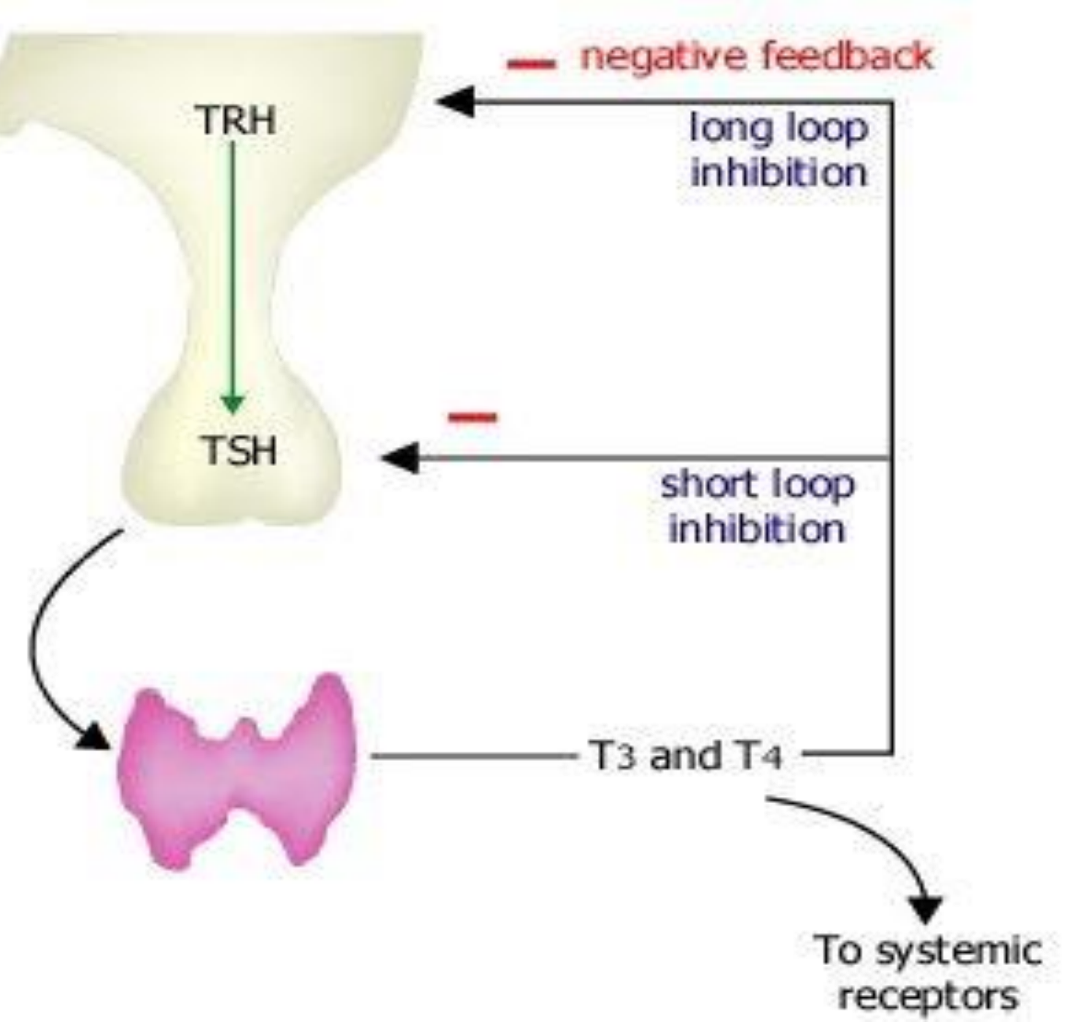
Follicles Are the Sites Where Key Thyroid Elements Function:

- Thyroglobulin (Tg)
- Tyrosine
- Iodine
- Thyroxine (T_4)
- Triiodothyronine (T_3)

Thyroid Hormones

- Thyroid pro-hormone is stored as thryoglobulin as an extracellular colloid
- T3 and T4 can cross lipid membranes readily (secretion and uptake)
- T3 and T4 are small, hydrophobic and circulate bound to Thyroxine-binding globulin (TBG)

Hypo – Pit-Thyroid Axis



Approach

- Clinical.
- Biochemical.
- Radiological.
- Histopathological.

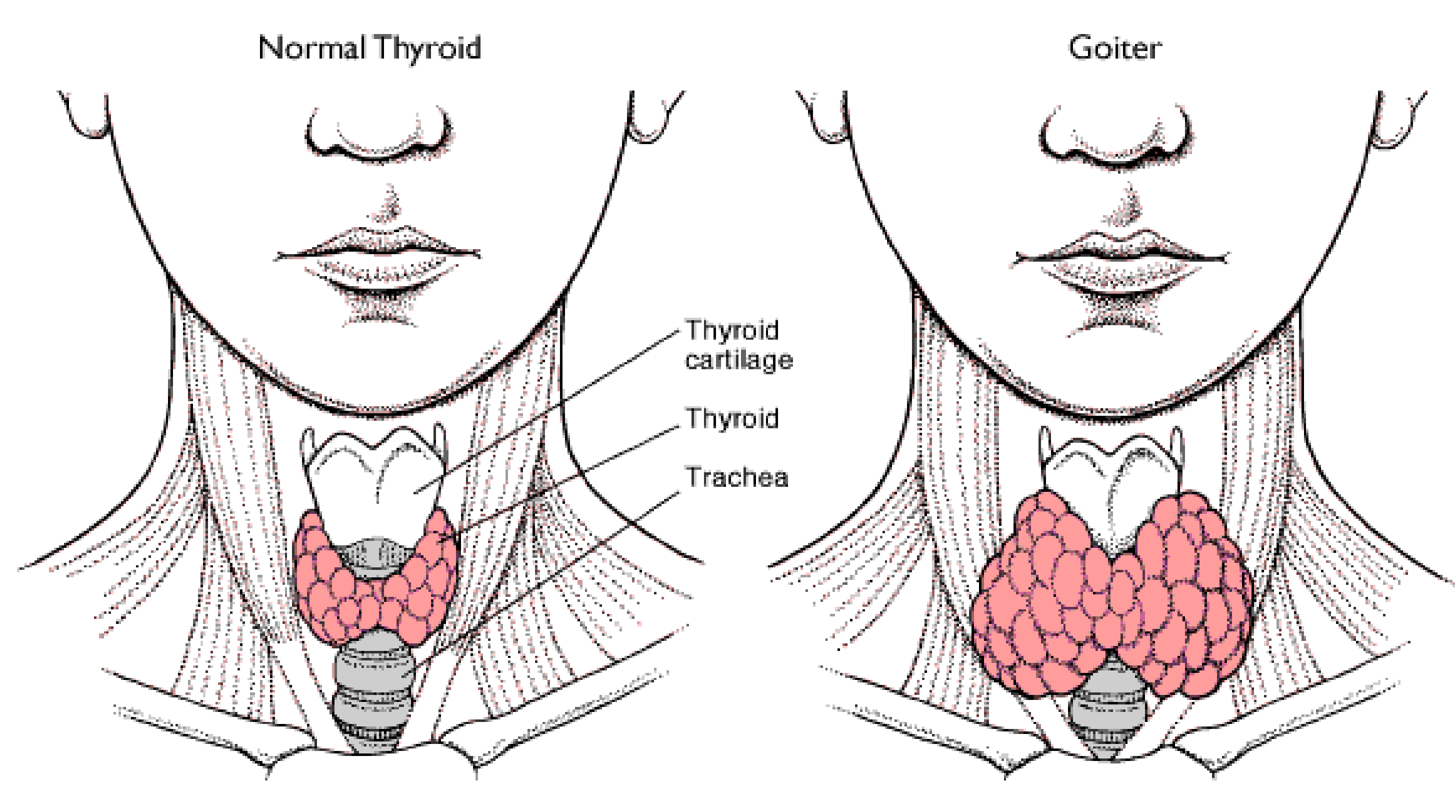
Spheres of diagnosis

- Anatomical.
- Physiological.
- Pathological

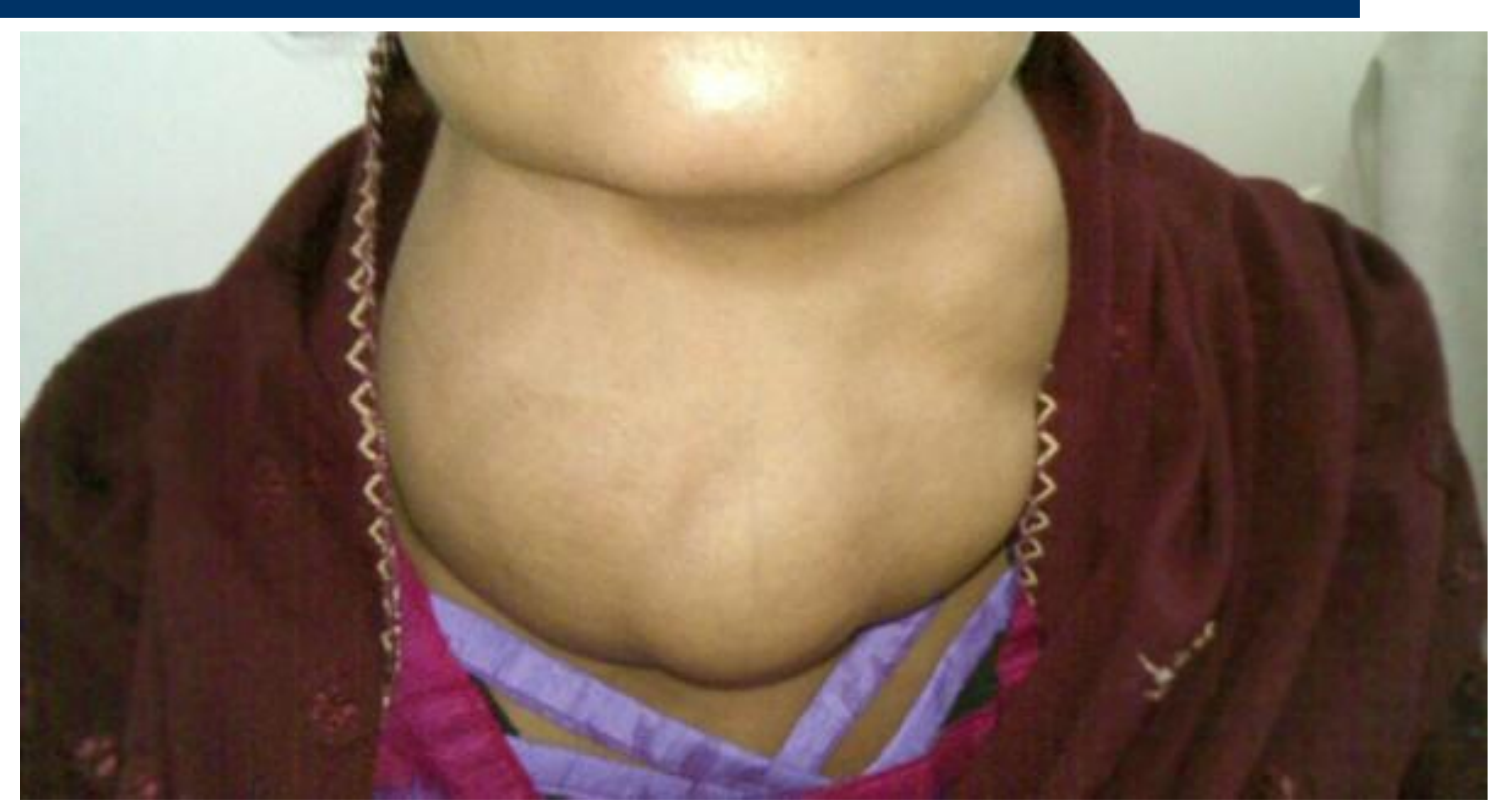
Anatomical

- Diffuse Goiter.
- Nodular Goiter:
  - MNG.
  - Solitary nodule.

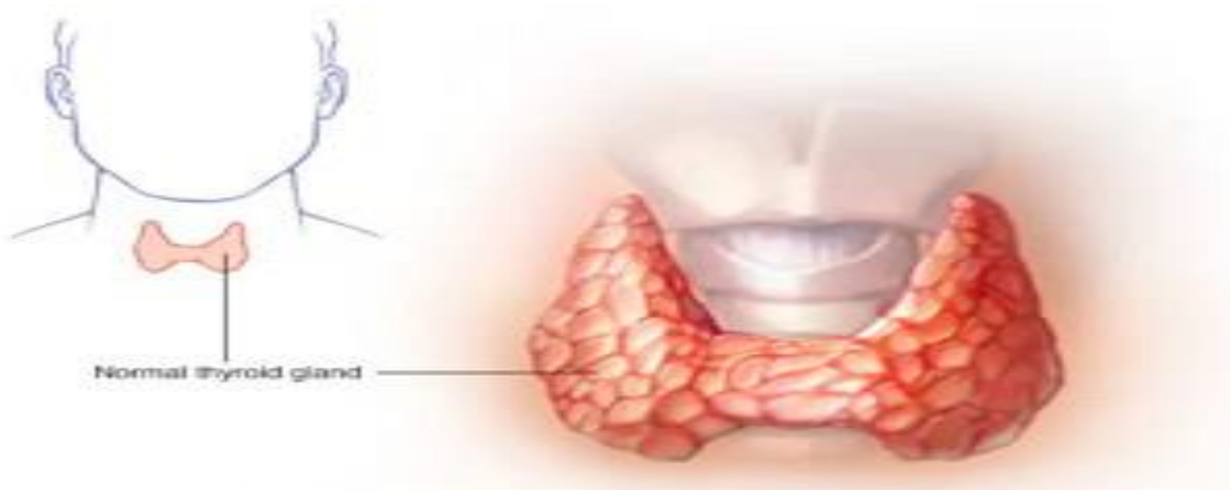
Anatomical Dx
Diffuse Goiter

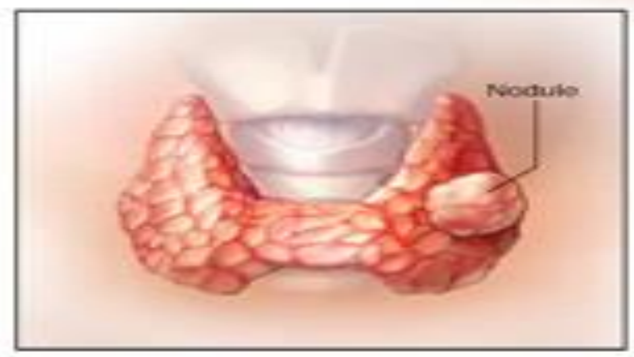

Normal Thyroid
Goiter
Thyroid cartilage
Thyroid
Trachea

Anatomical Dx
MNG

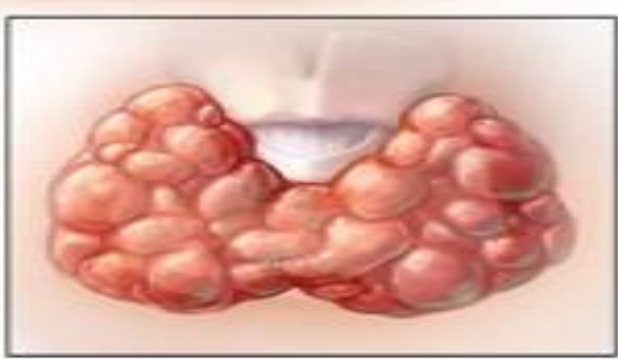


Anatomical Dx
Solitary Nodule

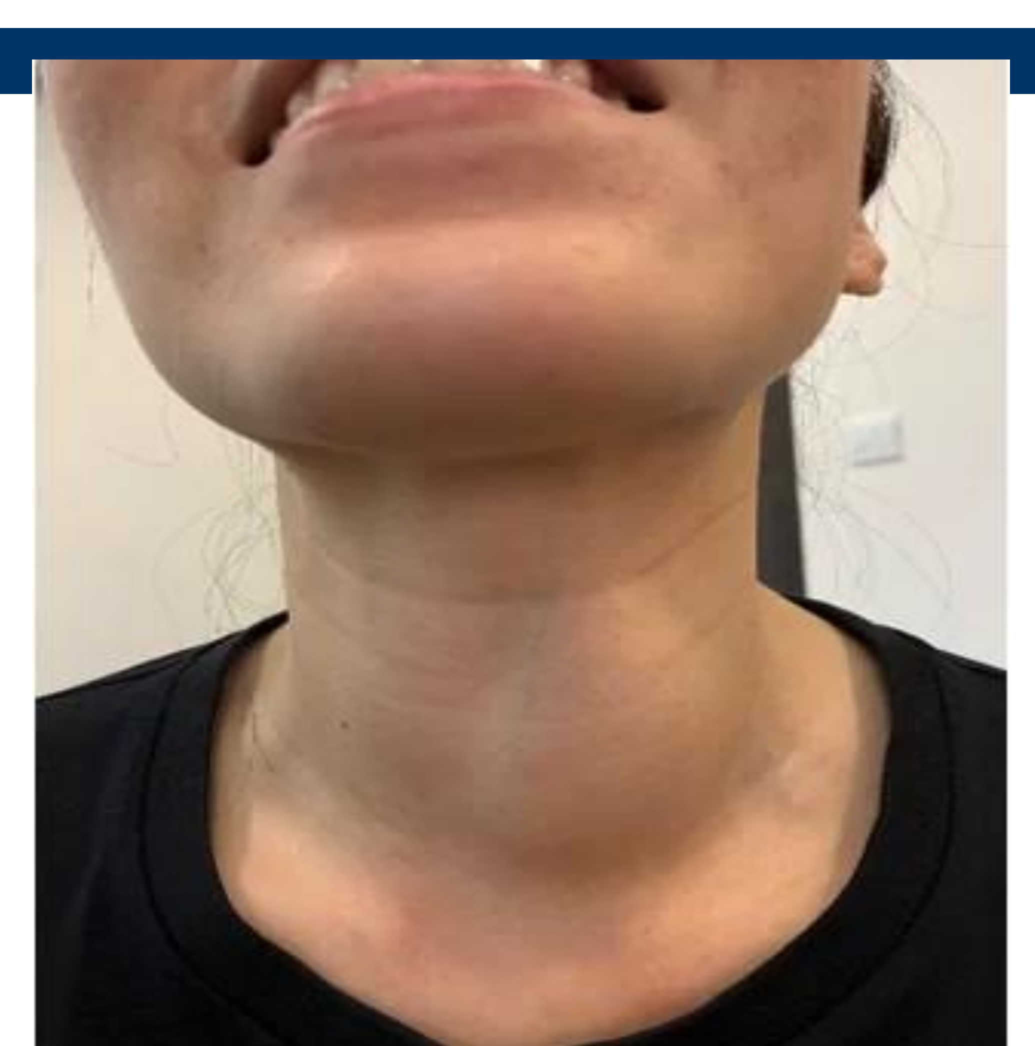




Thyroid with single nodule



Thyroid with multiple nodules
(Multi-nodular goiter)



How to reach Anatomical Dx

- Clinical.
- Ultrasound.
- CT scan, MRI.
- Thyroid scan.

Physical Exam

- Swelling in the anatomical site of thyroid.
- Moves with swallowing
- Dysphagea and Dyspnea suggest retrosternal extension.

- Anatomical dx includes

  retrosternal extension

  extension below sternocledomastoid

- Always Do Ultrasound.

Ultrasound

- One nodule or more
- Cystic or solid
- Presence or absence of features of malignancy
- Cervical LN enlargement

Features of malignancy in U/S

- Microcalcification.
- Hypoechoic nodules.
- Irregular margins.
- Taller than wide shape

Physiological

- Hypothyroid.
- Euthyroid.
- Thyrotoxic:
  - Hyperthyroidism.
  - Passive thyrotoxicosis

How to reach physiological Dx

- Clinical
- Lab tests
- Thyroid scan

Symptoms of thyrotoxicosis

- nervousness, tremors, sweating, heat intolerance, palpitations, wt loss despite normal or increased appetite, amenorrhea, weakness.

Hypothyroidism

- Lethargy, hoarseness, hearing loss, thick and dry skin, constipation, cold intolerance, stiff gait, weight gain.

Biochemical

- T3.
- T4.
- TSH.
- Antithyroid Antibodies: antithyroglobulin, antimicrosomal antibodies.

Thyroid scan

- Can differentiate between passive thyrotoxicosis and Hyperthyroidism.

Pathological

- Inflammatory:
  - acute.
  - subacute.
  - chronic.
- Neoplastic:
  - benign.
  - malignant.

Risk factors for malignancy

Age..........................Extremes of age
Sex..........................Male
family hx...................Positive
Growth ....Rapid
Pain.........................Painless
Voice.......................Hoarseness Medical
History.........................Hx of irradiation
Texture....................Hard
Lymph nodes..........Enlargement

Thyroid Noudules

- Neoplastic
- Non neoplastic

Non Neoplastic

- Cyst: degenerative, Hemorrhagic, Hydatid…
  - Surgery if symptomatic , recurrent, compressive , suspicious cytology .

- Solid : Part of Multinodular Goiter.

Neoplastic

- Benign: Follicular adenoma
- Malignant: Wide spectrum of behaviour

Papillary Ca

- Most common, Best prognosis
- 10 year survival around 95 %
- At younger age group.
- Spreads by lymphatics.
- Can be multifocal.
- Can be familial.
- Usually sensitive to RAI

Follicular Ca

- 10 y survival around 60 %.
- Associated with iodine deficiency.
- Usually monofocal.
- Haematogenous spread.
- Diagnosed by capsular and vascular infiltration.
- Sensitive to RAI.

Medullary Ca

- From Parafollicular cells.
- 10 year survival 25-30%
- Can be Familial or Sporadic.
- Can be part of MEN 2.
- Does not uptake RAI.

Anaplastic

- Around 1 %
- Very aggressive tumor.
- The worst prognosis
- Survival is usually less than 6 months

How to reach a pathological Dx

- Fine Needle Aspiration.
- Surgery for definitive biopsy.

U/S guided FNA

- Prefered if

  - > 50 % cystic lesion.

  - located posteriorly.

- In general
  Nodule < 1cm
  No FNA.

Bethesda score

Diagnostic category	Description	Risk of malignancy (%)
I	Non-diagnostic/unsatisfactory	1–4
II	Benign	0–3
III	Atypia or follicular lesion of undetermined significance	5–15
IV	Follicular neoplasm or suspicious for follicular neoplasm	15–30
V	Suspicious for malignancy	60–75
VI	Malignant	97–99

Serum Thyroglobulin

- Increases in most thyroid pathologies.
- Not specific as a diagnostic tool.
- For follow up only.

Serum Calcitonin

- Contraversy about its importance as a diagnostic tool.
- if >100 pg/ml can suggest medullary Ca.

Treatment

- Goals:

1 to remove the primary tumor and its local extension.

2 to minimize treatment related morbidity.

3 to permit accurate staging.

4 fascilitate postop. Radioactive Iodine ttt.

5-fascilitate long term postop. Surveilance

6-minimize disease reccurence and mets.

Thyroidectomy – Types

- **Hemi-thyroidectomy**: Removal of half of thyroid gland (Lobe + Isthmus+ Pyramidal)
- **Lobectomy**: Removal of either right of left lobe of thyroid gland

Both these are done in solitary goiter

- **Total thyroidectomy**: Removal of whole thyroid gland

This is done in cases of malignancy

Thyroidectomy types

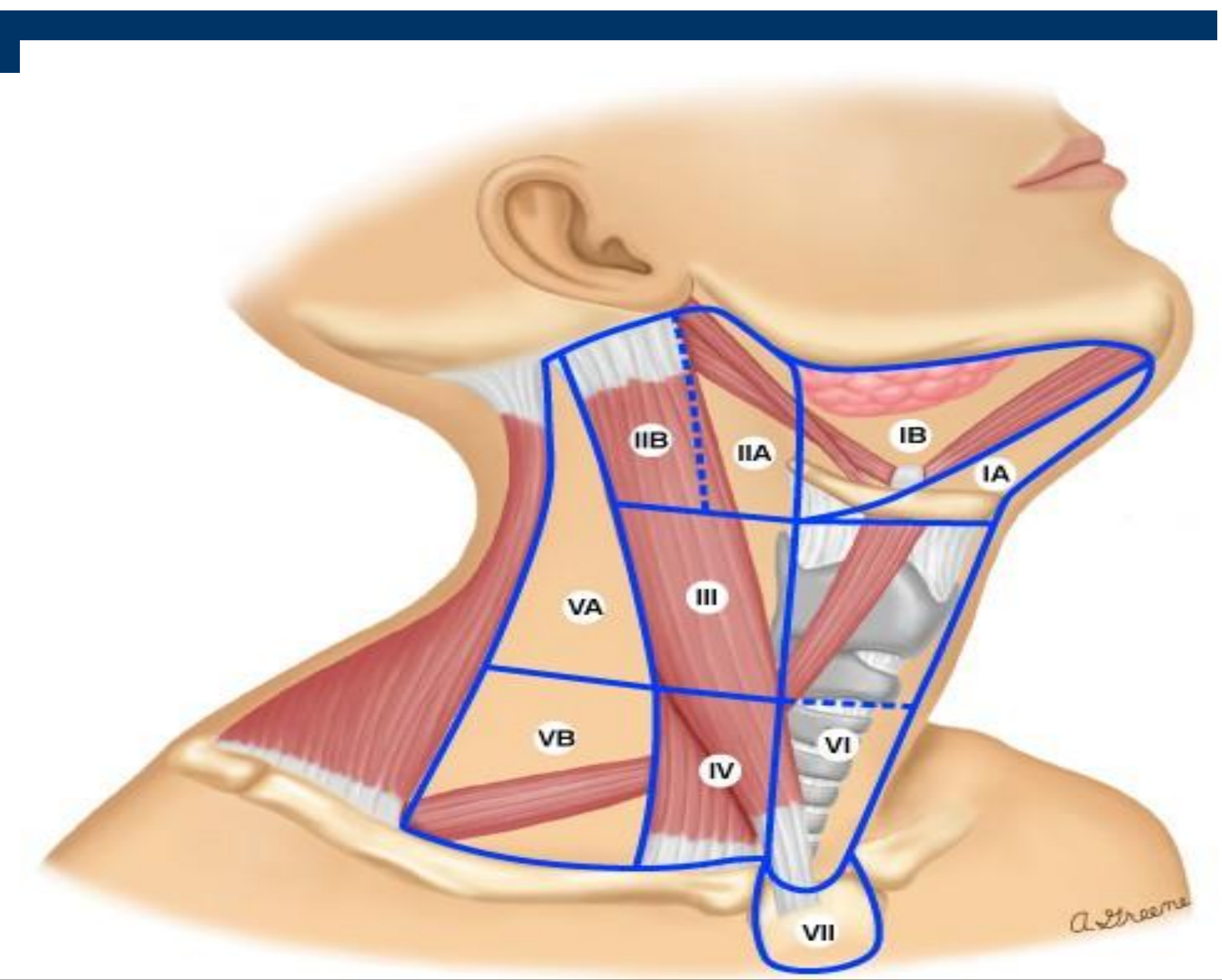
- **Near-total thyroidectomy**: Almost same as total, but a little thyroid tissue around one parathyroid gland is preserved
- **Isthmusectomy**: Dividing the isthmus

Neck Dissection

- Removal of fat and lymph nodes en-bloc.
- Lateral Vs central neck dissection.

Lateral neck dissection

- Lymph nodes around internal jugular vein.
- Only therapeutic.


IIB
IIA
IB
IA
VA
III
VB
IV
VI
VII
A Greene

Lateral Neck Dissection

Levels II,III,IV and V

Done only with biopsy proven metastases after clinical or sonographic suspicion

Central LN Dissection

- CLN are most common site of recurrence.
- Routine CLN dissection is indicated in medullary Ca., no consensus in papillary Ca.

Complications of thyroidectomy

- Intraoperative
  - Bleeding
    - Damage to arteries/veins of neck
- Postoperative presentation
  - Injury to recurrent laryngeal nerve
    - Unilateral: hoarseness
    - Bilateral: respiratory distress
  - Bleeding
    - Expanding hematoma – causes compression, shortness of breath
  - Hypocalcemia
    - Removal or injury to parathyroid glands or their blood supply
  - Scar

> If patient develops expanding neck hematoma postoperatively, treatment involves immediate opening of sutures to evacuate clot and return to OR to explore and stop bleed

Medical Treatment

- No data to suggest that TSH suppression will cause a change in thyroid nodule size in Iodine sufficient area.
- Not recomended.

Completion Thyroidectomy

- To allow resection of multicentric disease.
- Allow radioactive Iodine diagnostic scan and treatment.
- Studies:same surgical risk as one stage surgery.
- (small tumours<1cm,intrathyroid,node neg.,low risk group) can be managed without completion.

Postoperative Radioactive Iodine Ablation

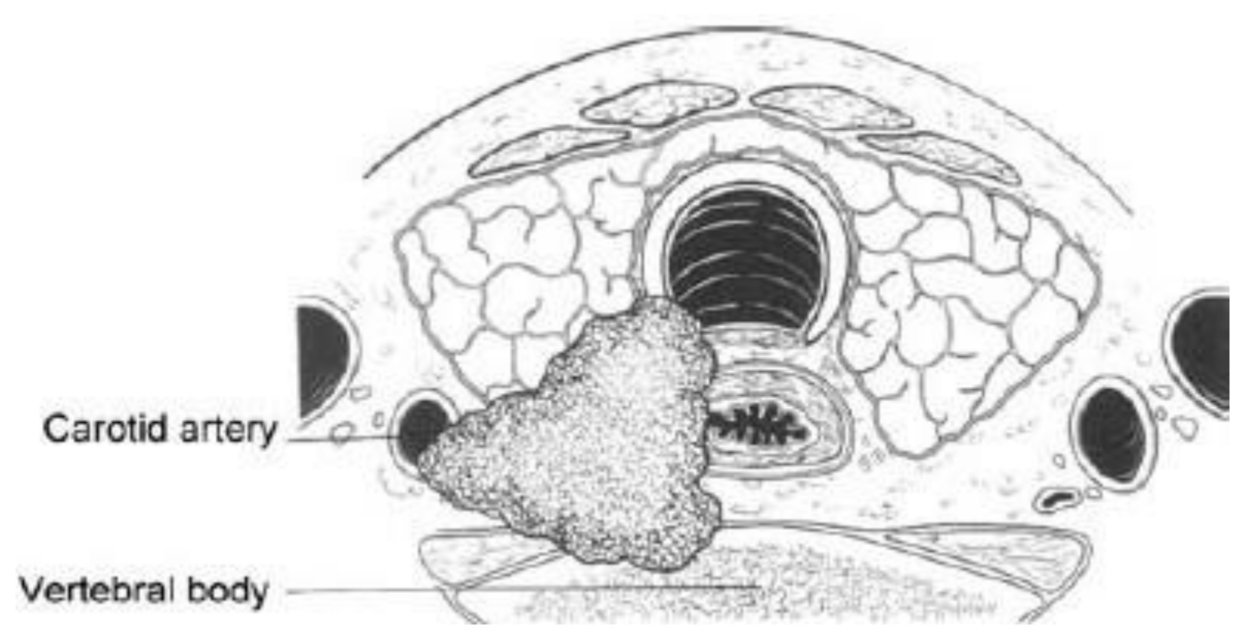
- Prepared with L-thyroxin withdrawal for 4 wks,or replace it with T3 for 2-4 wks then withdraw it for 2 wks.
- TSH > 30, to increase avidity.
- Higher dose 100-200, in residual disease or aggressive pathology(tall cell,columnar,insular)

External Beam Radiotherapy

- Indications

  - age > 45 and extrathyroid extension and high likelyhood of microscopic residual tumour.

  -gross residual and further surgery or radioactive iodine treatment is ineffective.


Carotid artery
Vertebral body

Chemotherapy

- NO role for chemotherapy in differentiated thyroid Ca.
- Some studies:Adriamycin can act as a radiation sensitizer for external beam radiotherapy.

Follow Up

- Every 6-12 months.
- Physical examination and cervical U/S
- Thyroglobulin and calcitonin.
- In borderline Tgn →stimulation by withdrawing thyroxin
- If positive→ whole body scan

Case scenario

A 42 year old female patient presents to the surgical clinic complaining of swelling in the anterior neck for 4 months duration, swelling is increasing gradually in size , also she reports palpitation and weight loss despite normal appetite

Your approach ?

Thank you